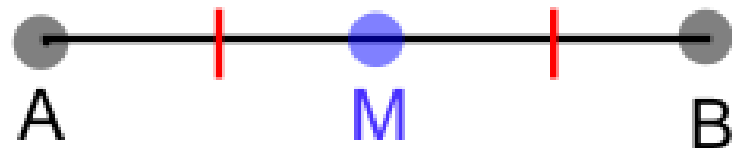


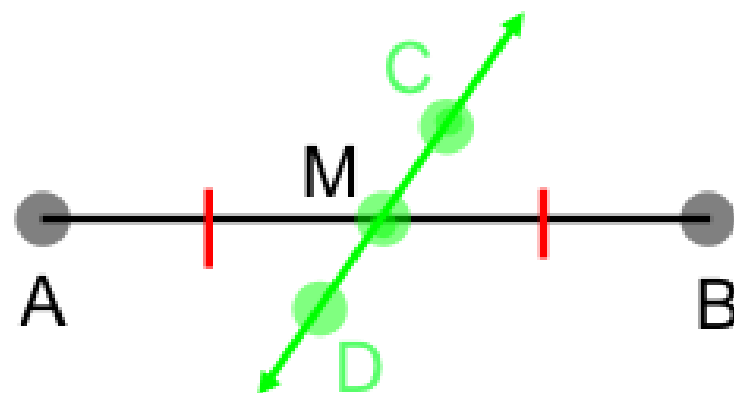
1.3 - Midpoint and Distance Formulas

Midpoint: point that divides the segment into two congruent parts

Segment Bisector: a point, ray, line, line segment, or plane that intersects the segment at its midpoint.



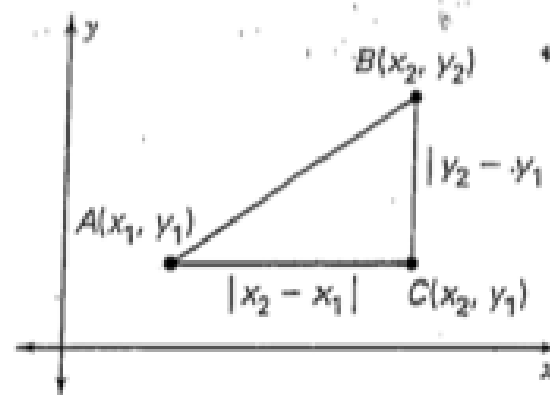
M is the midpoint of \overline{AB}
So, $\overline{AM} \cong \overline{MB}$ and $AM = MB$



\overleftrightarrow{CD} is a segment bisector of \overline{AB}
So, $\overline{AM} \cong \overline{MB}$ and $AM = MB$

THE DISTANCE FORMULA

If $A(x_1, y_1)$ and $B(x_2, y_2)$ are points in a coordinate plane, then the distance between A and B is



$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

5. What is the approximate length of \overline{GH} , with endpoints $G(5, -1)$ and $H(-3, 6)$?

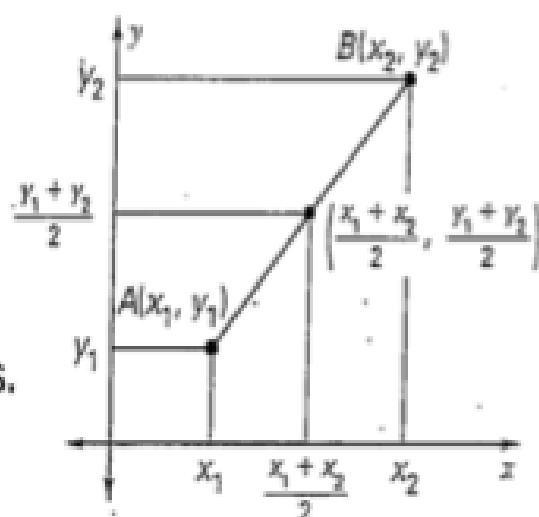
$$\begin{aligned} GH &= \sqrt{(-3 - 5)^2 + (6 - (-1))^2} \\ &= \sqrt{(-8)^2 + 7^2} = \sqrt{64 + 49} = \sqrt{113} \end{aligned}$$

THE MIDPOINT FORMULA

The coordinates of the midpoint of a segment are the averages of the x -coordinates and of the y -coordinates of the endpoints.

If $A(x_1, y_1)$ and $B(x_2, y_2)$ are points in a coordinate plane, then the midpoint M of \overline{AB} has coordinates

$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right).$$



2. Point K is the midpoint of \overline{JL} . Find the length of \overline{KL} .



Give These a Try at your Desk

Ex 1: Find the coordinates of the midpoint of the segment with the given endpoints.

C(3,5) and D(7,5)

$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

$$\left(\frac{3+7}{2}, \frac{5+5}{2} \right) = (5, 5)$$

Ex 2: Find the Midpoint of \overline{CD}

\overline{CD} : C(-2, 2) D(0, -4)

$$\frac{-2+0}{2}, \frac{2-4}{2} \quad \frac{-2}{2}$$
$$(-1, -1)$$

Ex 3: Find the Segment Length

\overline{AB} : A(0,2) B(-3,8)

$$\begin{aligned} AB &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \\ &= \sqrt{(-3 - 0)^2 + (8 - 2)^2} \\ &= \sqrt{(-3)^2 + (6)^2} \\ &= \sqrt{9 + 36} = \sqrt{45} = \sqrt{9} \sqrt{5} = 3\sqrt{5} \end{aligned}$$

Homework: p.19-21 #1, 2, 4-34 even, 23